REMARKS/ARGUMENTS

Reconsideration is respectfully requested of the Official Action of January 12, 2007, and the Advisory Action of May 15, 2007relating to the above-identified application.

A three-month extension of time, together with the associated fee, is filed herewith.

The claims in the case are 1 to 17.

The rejection of Claims 1 to 14 under 35 U.S.C. § 102(b) as anticipated by *Hartmann, et al.*, US 5,959,005, is traversed and reconsideration is respectfully requested.

Hartmann is assigned to the same assignee as the present application and discloses a surface modified, hydrophobic silanized silica powder with the following physico-chemical properties:

Specific surface area according to BET	m^2/g	80 – 400
Average Primary particle size area according to electron microscope	nm	7 – 40
Tamped density according to DIN ISO 787/11	g/l	50 – 300
pH value	3 – 10	
Carbon content	%	0.1 – 15
DBP number according to DIN 53601	%	< 200

The *Hartmann* method is carried out by spraying pyrogenically produced silica powder in a mixing container under intensive mixing, with water or dilute acid at first and then with hexamethyldisilazane (HMDS), followed by mixing for 15 to 30 minutes, and then tempering at a temperature of 100 to 400° C for a period of one to six hours to thereby obtain the desired hydrophobic silanized silica. Hexamethyldisilazane is the only surface modifying agent that is shown by *Hartmann*.

The hexamethyldisilazane used by *Hartmann* (HMDS) as shown on the document from the National Library of Medicine (of record) is a structure containing six methyl groups in total formed by two trimethylsilyl groups.

The structure is also shown in the attached article from Wikipedia entitled "Bis(trimethylsilyl)amine which is another name for HMDS.

The article by Pierce "The Protein People" also shows the structure of HMDS.

It is clear that HMDS contains only trimethyl groups. Hence, when the HMDS is used for the silanization process by *Hartmann*, the result is the formation of trimethylsilyl groups on the surface of the silica.

In the Advisory Action, the Examiner has invited applicants to show that the silanised silica of *Hartmann* does not contain the dimethylsilyl and/or monomethylsilyl groups which are present in the claimed silica herein.

In response, applicants advise that during the process of making the silica hydrophobic, the bond between the nitrogen atom and the silicon atom is broken and exchanged with the OH-group of the silica. This results in a siloxane bond between the silica and the trimethylsilyl group. The consequence is that on the surface of the silica only trimethylsilyl groups are fixed.

This is also shown in the article from Transene Company, Inc., a provider of semiconductor materials (obtained from the internet).

The article describes the use of HMDS to provide photoresist adhesion on silicon and silica (SiO_2). Note that the article shows that the end product would have the formula Si-O-$Si(CH_3)_3$; namely, the formation of trimethylsilyl groups on the silica surface.

Clearly, the state of the art recognizes that HMDS will form only trimethylsilyl groups in silica.

In contrast therewith, applicants' claims call for the formation on the surface of only dimethylsilyl or monomethylsilyl groups. *Hartmann* does not describe the presently claimed subject matter within the meaning of 35 U.S.C. § 102(b). No dimethylsilyl groups or monomethylsilyl groups are shown in *Hartmann* nor would those groups be formed on the silicas of *Hartmann* since the structure of the HMDS contains only trimethylsilyl groups.

No reason has been advanced in the Final Action to support a conclusion that by reacting silicas with HMDS the product would be the same as applicants' product.

A rejection under 35 U.S.C. § 102 cannot be based on speculation. As noted in the MPEP 2112, rejections must be based on a rationale or evidence to support a rejection on the ground of inherency.

Applicants respectfully submit that Claims 1 to 14 are not anticipated by the cited reference. Withdrawal of the rejection is therefore respectfully requested.

The rejection of Claims 1, 5, 6, and 15 – 17 under 35 U.S.C. § 102(b) in view of *Bock, et al.* (US 6,020,419) is traversed and reconsideration is respectfully requested. *Bock* describes, as stated in the Official Action, a transparent coating composition containing a binder and nanoscale primary particles which are obtained by jet dispersion of the nanoscale particles in the coating composition.

Applicants' claims call for a structurally modified, silanized pyrogenic silicas. Structural modification in the field of silicas is well known; see *Nargiello, et al.*, US 6,193,795 (copy

enclosed). *Bock* does not disclose structurally modified products and therefore fails to disclose a feature of applicants' invention.

The silica according to the present invention has been structurally modified such as by passing through a ball mill before it is used in a lacquer composition. Structural modification is not shown by *Bock* and, therefore the *Bock* patent fails to anticipate the claimed invention.

In view of the foregoing, it is respectfully submitted that the rejection of the claims as anticipated in view of *Bock* is not well considered and, therefore, the rejection should be withdrawn and the claims allowed.

Favorable action at the Examiner's earliest convenience is respectfully requested.

Respectfully submitted,

By: Robert G. Weilacher, Reg. No. 20,531

Dated: June 19, 2007
SMITH, GAMBRELL & RUSSELL, LLP
Suite 3100, Promenade II
1230 Peachtree Street, N.E.
Atlanta, Georgia 30309-3592
Ph: (404) 815-3593
Fax: (404) 685-6893

Bis(trimethylsilyl)amine

From Wikipedia, the free encyclopedia
(Redirected from Hexamethyldisilazane)

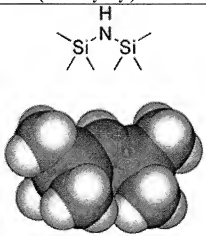
Bis(trimethylsilyl)amine (also known as hexamethyldisilazane, or HMDS) a chemical reagent with molecular formula $(CH_3)_3Si\text{-}NH\text{-}Si(CH_3)_3$ which consists of ammonia substituted with two trimethylsilyl functional groups. It is a clear, colorless liquid that will hydrolize slowly upon exposure to water.

A **bis(trimethylsilyl)amide** (also known as hexamethyldisilazide) results from the deprotonation of the nitrogen atom of bis (trimethylsilyl)amines and are used as strong hindered bases:

Examples of these bases are:

- Lithium bis(trimethylsilyl)amide (LiHMDS)
- Sodium bis(trimethylsilyl)amide (NaHMDS)
- Potassium bis(trimethylsilyl)amide (KHMDS)

Bis(trimethylsilyl)amine[1]



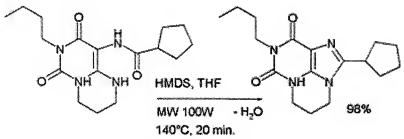
Chemical name	1,1,1,3,3,3-Hexamethyldisilazane
Other names	Bis(trimethylsilyl)amine Hexamethyldisilazane Hexamethyldisilane HMDS
Chemical formula	$C_6H_{19}NSi_2$
Molecular mass	161.40 g/mol
CAS number	[999-97-3]
Density	0.76 g/cm^3
Melting point	-78 °C
Boiling point	125 °C
SMILES	CSi(C)(C)NSi(C)(C)C
NFPA 704	

Disclaimer and references

Contents

Uses in organic chemistry

One of the uses of HMDS is as a reagent in condensation reactions of heterocyclic compounds such as in the microwave synthesis of a derivative of xanthine [2]:



See also

- Hexamethyldisiloxane

References

1. ^ *Merck Index*, 13th Edition, **4708**.
2. ^ *Microwave-assisted Ring Closure Reactions: Synthesis of 8-substituted Xanthine Derivatives and related Pyrimido- and Diazepinopurinediones* Burbiel J, Hockemeyer J, Mueller C Beilstein Journal of Organic Chemistry, **2006** 2:20 (27 October 2006) DOI:10.1186/1860-5397-2-20 (http://dx.doi.org/10.1186/1860-5397-2-20)

External links

- MSDS for bis(trimethylsilyl)amine (http://www.jtbaker.com/msds/englishhtml/h2066.htm)
- Links to external chemical sources

Retrieved from "http://en.wikipedia.org/wiki/Bis%28trimethylsilyl%29amine"

Categories: Amines | Silicon compounds | Reagents for organic chemistry

HEXAMETHYLDISILAZANE- HMDS

PHOTORESIST ADHESION WITH HEXAMETHYLDISILAZANE
Purified hexamethyldisilazane (HMDS) preparations promoting photoresist adhesion on silicon and other substrates.

HMDS - X10

10% HMDS solution in xylene

HMDS - X20

20% HMDS solution in xylene

HMDS - 100%

HMDS concentrate

FEATURES

- Ready-to-use preparations for surface treatment of silicon
- Promotes photoresist adhesion on silicon and SiO2 films
- Prevents lift-off at edges of photoresist and reduces undercutting
- Ensures full-line resolution
- Improves yields of MOS and integrated silicon devices

HMDS- Photoresist Adhesion with Hexamethyldisilazane

DESCRIPTION:

HMDS is a purified hexamethyldisilazane with the chemical formula [(CH3)2Si]2NH. The product is used to augment the adhesion of photoresist on silicon and SiO2 surfaces.

The effectiveness of HMDS on adhesion is correlated with the reactivity of this compound with surface hydroxyl groups to form a new siloxane end product, i.e. Si-O-Si(CH3)3. This newly formed termination on the substrate renders the surface more hydrophobic in character and leads to greater wettability by photoresist. The latter condition is a crucial factor in good bonding. As a result of these altered characteristics due to the surface chemistry, the treated silicon surfaces become highly compatible with both negative and positive photoresists.

HMDS is offered in usable concentrations diluted with xylene as HMDS-X10 and HMDS-X20. Special blends are supplied upon request.

PROPERTIES OF HMDS (ACTIVE INGREDIENT)

PHYSICAL	
Appearance	Clear, colorless liquid
Density	0.77 g/cc
Index of Refraction	1.4
Molecular Weight	161.4
Boiling Point	126-127 °C
Flash Point	27 °C
CHEMICAL	
Typical Purity	99+%
Sodium	< 1 ppm
Iron	< 1 ppm
Lead	< 1 ppm
Copper	< 1 ppm

Copper	< 1 ppm

APPLICATION:

HMDS preparations are generally applied to the silicon wafer while spinning, prior to the application of photoresist. As an alternative procedure, the wafers may be immersed in HMDS preparations and allowed to dry after removal.

TRANSENE COMPANY, INC.
DANVERS INDUSTRIAL PARK • 10 ELECTRONICS AVENUE • DANVERS, MA 01923
TEL: 978 777-7860 • FAX: 978 739-5640 • WWW.TRANSENE.COM

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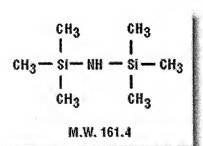
Hexamethyldisilazane (HMDS)

Attaches a small silane molecule to make the surface inert.

Pierce HMDS is a popular monofunctional silane that many researchers have found useful for deactivating and coating HPLC or GC chromatographic supports. Because of their monofunctional nature, these silanes can react with only one site on the surface. Polymerization is not possible, eliminating the chances for unbound polymers to float free and elute from the column – avoiding exposure of unreacted silanols beneath the layer. In addition, surface moisture is eliminated, because monofunctional reagents dehydrate the surface.

HMDS is also used for deactivating glass wool and for treating GC injection port glass inserts. Several methods are available for deactivating surfaces with HMDS. The item(s) to be deactivated may be dipped in a 5-10% solution of the reagent in a non-reactive solvent. Vapor phase deactivation may be performed by pulling straight vapor into an evacuated container containing the item to be deactivated. To deactivate glass wool, a few milliliters of HMDS may be added to a beaker along with the item and a watch glass placed on top of the beaker.

In addition to deactivation of glass surfaces, HMDS is a popular choice for silylation of sugars and related substances. HMDS greatly extends the practical range of GC, improving chromatographic results in the silylation of sugars and related substances.



Highlights

- Soluble in organic solvents
- Used for deactivating HPLC or GC packings and glass wool

References

1. Ren, S., et al. (1992). O-acetylated gangliosides in bovine buttermilk. Characterization of 7-O-acetyl, 9-O-acetyl, and 7,9-di-O-acetyl GD3. *J. Biol. Chem.* **267**, 12632-12638.
2. Novina, R. (1982). Gas Liquid Chromatography of Isopropylidene Monosaccharides and their Trimethylsilyl Derivatives. *Chromatographia* **15**, 241.
3. De Jong, A.P.J.M. et al. Derivatization of Catecholamines in Aqueous Solution for Quantitative Analysis in Biological Fluids. *J. Chromatography*, **276**, 267.
4. Mateo, R., et al. (1987). Capillary column gas chromatographic identification of sugars in honey s trimethylsilyl derivatives. *J. Chromatography*, **410**, 319.

Ordering Information

Certificate of Analysis | Instruction Book with Protocols | MSDS

Buy	Product #	Description	Pkg. Size	Files	Price
Add	84769	Hexamethyldisilazane (HMDS)	100 g		$64.00
Add	84770	Hexamethyldisilazane (HMDS)	25 g		$36.00